Field Guide for Potential Maternity Roost Tree (PMRT) Determinations

2016 Programmatic Agreement for Indiana Bat and Northern Long-eared Bat

PMRTs are trees that provide suitable summer roosting habitat for Indiana bat or northern long-eared bat maternity colonies. Maternity roost trees have the following habitat characteristics:

- Live or standing dead trees or snags over 16 in diameter at breast height (dbh) with exfoliating, peeling or loose bark, split trunks and/or branches, or cavities.
  - These characteristics must be plentiful enough (i.e., enough area in which the colony can roost) to allow the colony to change locations along the tree to aid in thermoregulation.
- Each area of habitat does not have to cover a large area, as a group of roosting bats can fit into a very small space.
- If the habitat characteristics are found only on the branches of the tree, the branches must be at least 8 inches in diameter at the site of the habitat characteristics.
- Structural roosting characteristics must be at least 13 ft above the ground
- Trees must have solar exposure **and**
  - within 1,000 ft of *SWH* **or**
  - part of or connected to a Travel Corridor that is connected to either a) SWH that is 0.5 ac or larger or b) any wooded riparian corridor.

Solar Exposure is direct sunlight to the trunk or branches where suitable roosting habitat is found for all or part of the day. Maternity roosting trees require some solar exposure to aid in thermoregulation of pregnant female bats and newborn pups. This solar exposure can come from the tree being at the edge of a forested tract, at the edge of a distinct gap within a forested tract, or because the tree is a super canopy tree (much taller than the trees around it).

The photos in this field guide are of field-verified maternity roost trees from various locations within Ohio. Photos were provided by USFWS, Ohio Field Office.

Dead American elm with solar exposure and several areas of peeling bark

Potential Maternity Roost Tree Determination - Please see the PMRT definition in the Glossary and example PMRT photos in this appendix.

FIELD PROCEDURE

PMRTs must be identified for all projects where SWH will be impacted further than 100 feet from the edge of the roadway. For projects where three acres or less of SWH is going to be impacted outside of 100 feet of the roadway, all PMRTs within the project area must be identified, located using GPS, and photographed. For projects where over three acres of SWH will be impacted beyond 100 feet of the roadway, note the approximate number of PMRTs in the project area, note any areas that contain a concentration of PMRTs in the text and mapping, and include representative photos in the ESR.

Project CRS		**Examiner**		**Date of Observations**	
Project Area (ac)					

Tree ID #	**dbh in inches**	**Species**	**Condition**	**Crevice, split, or cavity present? Y/N**	**% loose bark above 4 m (13 ft)**	**Approx. hours of solar exposure**	**Located with GPS Y/N**

Indiana Bat and Northern Long-eared Bat Field Habitat Assessment Checklist

PROJECT INFORMATION					
CRS:		PID:		Date:	

MANAGEMENT UNIT	
Eastern MU	☐
Western MU	☐

BAT RECORD SEARCH		
Is project in a known bat buffer?	Yes ☐	No☐
Record type(s) (color)?		
Additional Info including date of records request:		

BRIDGE HABITAT ASSESSMENT		
Will Project Impact a Bridge over a stream?	Yes ☐	No☐
Bridge Inspection Conducted?	Yes ☐	No ☐
Results of Inspection including date:		

SUITABLE WOODED HABITAT ASSESSMENT		
Will Project Impact Suitable Wooded Habitat (SWH)?	Yes ☐	No☐
Is all SWH to be impacted within 100 feet of the roadway? If yes, just fill out Line 1. If no, fill out all lines.	Yes ☐	No☐
Line 1. Acreage of SWH within 100 feet of the roadway	ac.	
Line 2. Acreage of impacted SWH within 50 feet of a perennial stream but outside 100 feet of the roadway.	ac.	
Line 3. Acreage of impacted SWH further than 100 feet of the edge of the roadway and not located within 50 feet of a perennial stream.	ac.	
Line 4. Number of impacted PMRTs further than 100 feet of the edge of the roadway. Fill out PMRT table if PMRTs will be impacted.		

Appendix B. Field Procedure for Determining Potential Maternity Roost Trees within an ODOT Project Area.

Suggested Equipment: datasheet, pen, GPS, binoculars, measuring tape, tree field guide, study area map, camera.

1. Determine if any tree removal will occur further from 100 feet from the edge of pavement. If all tree removal is contained within 100 feet, no further survey work for PMRTs is required.
2. Walk the project area identifying and examining trees equal to or greater than 16" dbh with roosting habitat.
3. Once a potential tree is identified:
    a. Give the tree a unique ID number for this project (i.e. 1, 2, 3 etc)
    b. Record the species of tree.
    c. Take a photograph of the tree
    d. With a measuring tape measure record the diameter of the tree at breast height (dbh).
    e. Record if the tree is alive, dying, or dead.
    f. Examine the tree from the base to top using binoculars as needed. Search the entire tree for areas of potential roosting habitat (a covered space where an animal the size of a mouse could fit under or inside) such as loose bark, splits, or crevice. Walk around the tree and view the upper limbs, trunk and canopy from several observation points.
    g. Does the tree have crevice(es), split with a cavity, or a cavity? Yes/No
    h. Estimate the % areal coverage of loose bark that is at least 4 m (13 ft) above the ground. Record the % of loose bark on the tree.
        i. 0-5%
        ii. 5-25%
        iii. 25-50%
        iv. 50-75%
        v. 75-100%
    i. Is the potential roost habitat identified exposed to the sun during the day? Yes/No
    j. Record the position of the tree with a GPS.
    k. Determine if the tree is a Potential Maternity Roost:
        i. Is the tree 40.6 cm (16 in) or larger dbh?
        ii. Does the tree present loose bark, a cavity, or crevice 4 m (13 ft) above the ground capable of hiding several bats?
        iii. Is the available roosting area described above in part ii exposed to the sun for a majority of a summer day?
        iv. If the answer to f.i., f.ii., and f.iii. are all yes, the tree is a potential maternity roost tree.

4. Incorporate the data form, photographs of the trees, and any additional comments regarding the project impacts to the species into the Ecological Survey Report (ESR).

Please see the attached PMRT field guide for more information and example photographs of confirmed PMRTs. Field data forms are included below.

Appendix A
Glossary of Terms

The following terms have been defined for use in this PC.

FORAGING AREAS

Foraging areas are defined as natural area or spaces that approximate a natural area (e.g., a park, restored area) that provide a food supply (insects) for adult Indiana and northern long-eared bats and their young, and may serve as night roosts for resting and digesting meals. These areas may be within or on the edge of forested areas. Areas with an open sub-canopy provide the best foraging habitat. Foraging areas occur along streams, in floodplain forests, in and around forested wetlands and impoundments, and in and over forests. Streams without riparian corridors will not be considered foraging areas under this definition.

HIBERNACULUM

A hibernaculum is an area where bats hibernate during the winter. Hibernacula are typically caves or abandoned mines that provide cool, humid, stable conditions for hibernation.

POTENTIAL MATERNITY ROOST TREE (PMRT)

A PMRT is a tree that provides suitable summer roosting habitat for an Indiana bat or northern long-eared bat maternity colony[1]. Maternity roost trees have the following habitat characteristics:

- Live or standing dead trees or snags over 40.6 cm (16 in) diameter at breast height (dbh) with exfoliating, peeling or loose bark, split trunks and/or branches, or cavities.
    - These characteristics must be plentiful enough (i.e., enough area in which the colony can roost) to allow the colony to change locations along the tree to aid in thermoregulation.
- Each area of habitat does not have to cover a large area, as a group of roosting bats can fit into a very small space.
- If the habitat characteristics are found only on the branches of the tree, the branches must be at least 20.3 (8 in) in diameter at the site of the habitat characteristics.
- Structural roosting characteristics must be at least 4 m (13 ft) above the ground (see photo gallery in attached User's Guide).
- These trees must have solar exposure **and** must be
    - within 305 m (1,000 ft) of *SWH* (see definition below) **or**
    - part of or connected to a Travel Corridor that is connected to either a) SWH that is 0.2 ha (0.5 ac) or larger or b) any wooded riparian corridor.

SOLAR EXPOSURE

Solar exposure is direct sunlight to the trunk or branches where suitable roosting habitat is found for all or part of the day. Maternity roosting trees require some solar exposure to provide thermoregulation to the young. This solar exposure can come from the tree being at the edge of a forested tract, at the edge of a distinct gap within a forested tract, or because the tree is a super canopy tree (much taller than the trees around it). See photo gallery of potential maternity roost trees in attached User's Guide for examples of trees receiving adequate solar exposure.

[1] A maternity colony consists of reproductive females and their young that may number 100 individuals or more.

SUITABLE WOODED HABITAT (SWH)

Any tree covered area that is 0.2 ha (0.5 ac) or larger, containing any potential roosts (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities) greater than 4 m (13 ft) tall and at least 7.6 cm (3 in) dbh, **OR** any patch of trees with these characteristics that is less than ½ acre in size but is within 1,000 feet of or connected by a travel corridor to a PMRT, ½-acre or larger stand of SWH, or any patch of wooded riparian buffer. ***(It is important to note that the entire tree covered area – i.e., all trees, not just the trees with roost characteristics – are considered SWH if this definition is met.)***

TRAVEL CORRIDOR

A travel corridor is a contiguous linear wooded corridor that connects roosting and foraging areas, and may be used during migration. These corridors may be riparian areas along streams, wooded fence rows, small wooded roads and paths, open-understory forest, or wood lines in residential areas that are within 1,000 feet of SWH. Trees should be greater than 4 m (13 ft) tall and at least 7.6 cm (3 in) dbh.

iv. For projects where 3 acres or more of SWH are being removed further than 100 feet of the roadway, record data and take photos of all PMRTs if 10 or fewer may be impacted. If more than 10 PMRTs may be impacted, estimate the number of PMRTs in the project area, take representative photos of at least 10 of the PMRTs, locate areas of high PMRT density on the map, and record data for the trees that were photographed on the PMRT checklist. To estimate PMRTs, count the number of PMRTs found within one acre of habitat, and multiply by the number of acres of SWH. Other methods may be more suitable depending on the project type and location. If another method is used, describe the estimation method in the ESR.

v. After the information is collected, fill out all sections of the Field Checklist and the Potential Maternity Roost Tree Determination form (if PMRTs are present) (Appendix B). Both forms will be included in the ESR in the appendices, and the results will be summarized in the Federal Species table in the ESR form.

Figure 2. Example project area showing SWH types.

Legend

_____ Project Area

_____ 100' EOP

_____ SWH within 100' EOP – 1.45 acres

_____ SWH within 50' of perennial stream, but not within 100 ' EOP. – 0.20 acres

_____ SWH outside 100' of EOP – 0.38 acres

Bat Presence/Absence Surveys: In areas that are NOT in a known Indiana bat buffer, the project sponsor can choose to perform presence/absence (P/A) surveys for Indiana bat. This method may be recommended for large projects that may require mitigation and/or if the project sponsor wants to cut trees during the active season. Based on the final 4(d) rule, positive NLEB detections will not require seasonal clearing. If the survey does not detect Indiana bats, the project can be coordinated through the batched process (no individual review from USFWS) and will not require seasonal clearing. Bat P/A surveys should only be conducted when ODOT or the project sponsor requests the surveys, and the survey is part of the consultant's scope. The consultant performing the bat survey (whether mist net or acoustic) will have received study plan approval from the USFWS prior to performing the survey work, and the survey results must be coordinated with USFWS. USFWS will not accept results of surveys for which a study plan was not approved by them in advance. These surveys must follow the most updated version of the USFWS Rangewide Indiana bat Summer Survey Guidelines:

http://www.fws.gov/midwest/endangered/mammals/inba/inbasummersurveyguidance.html

Projects that will impact bridges over streams:

If the bridge is 20 feet in length or longer, a bridge inspection to determine if bats are using the bridge is required. This survey work should be done at the time of the ecological survey. For bridges that show signs of frequent flooding (flood debris trapped under the deck in the substructure, or if the underside of the bridge does not contain any areas that could be used for roosting, the results of the inspection will be "bridge does not provide roosting habitat", and no further active season (April 1 to September 30) inspection will be required. If the bridge does contain suitable habitat, the underside of the structure will have to be inspected for bat usage during the active season. If ecological field work is to be conducted outside of the active season, other bridge inspection data from ODOT or county bridge inspectors may be available. Please contact the DEC to determine if other information is available for the structure. If previous inspection data is not available, the bridges will be inspected by ODOT staff or by a consultant under a separate contract during the active season. The bridge inspections are to be performed within one year of construction. Since many projects are coordinated more than one year prior to construction, ODOT or their consultant may have to inspect bridges that were already inspected during the ecological survey. If a consultant is contracted to do a bridge inspection outside of the ecological survey, the same guidance will be used, and the bridge inspection form will be coordinated with USFWS as a separate document. Contact OES for guidance in circumstances where the ecological survey is performed outside of the active season, or if the bridge cannot be fully inspected because of size, access, or height. Follow the FHWA/State DOT/FRA Preliminary Bat Inspection Guidelines for Bridges/Structures (Appendix C), and include a copy of the inspection form for each structure that will be impacted by the project in the ESR.

Data Collection:

Projects with tree removal:

1. Determine if Suitable Wooded Habitat (SWH) is present within the project area. (See Appendix A for definition). Please follow the guidance below to determine if the project area contains SWH.
    a. Trees that are located between the sidewalk and the roadway (or front yard trees very near the road if no sidewalks) in cities and areas of dense suburban development are **not** SWH, even if they have roosting characteristics. These should not be reported as SWH in the Ecological Survey Report (ESR)
    b. Small patches of trees (less than 0.5 acre) and single trees that **do not** contain roosting habitat are not SWH if they are not part of or connected to a larger woodlot (refer to definition of Travel Corridor in Appendix A). These trees should not be reported as SWH in the Ecological Survey Report (ESR).
    c. Single trees and small patches of trees (less than 0.5 acre) that **do** possess roosting characteristics may be considered SWH if they are within 1,000 feet of forested areas, or are connected to forested patches via travel corridors or a line of trees (see definition of Travel Corridor in Appendix A). In this situation, the trees should be reported as SWH, and OES will work with USFWS to confirm the determination.
    d. Any trees that are part of an area larger than 0.5 acre that meets the NLCD[2] or Anderson[3] definitions of a type of forest (upland forest, riparian forest, forested swamp) are all considered SWH and should be reported in the ESR.
    e. If the surveyor making the determination is not sure an area qualifies as SWH, report the area as SWH and explain any issues in the "Additional Information" portion of the table.

2. Determine if all SWH to be removed is within 100 feet from the edge of pavement of the roadway.
    a. For all of the SWH that will be impacted within 100 feet of the edge of pavement:
        i. Record the acreage of SWH and take representative photos of the SWH within the project area. As with all photos in the ESR, the photos must be labeled with a caption describing the photo.
        ii. Fill out the appropriate portion of the Field Checklist (Appendix B). This checklist will be included in the ESR in the appendices, and the results will be summarized in the Federal Species table in the ESR form.
    b. For any SWH that will be impacted that is further than 100 feet from the edge of the pavement, additional information must be collected:
        i. Calculate the acreage of SWH within riparian corridors. These riparian corridor areas include any SWH within 50 feet of streams that have a drainage area greater than one square mile at the location of the impacts. Only the SWH impact further than 100 feet from edge-of-pavement and along the riparian corridor should be reported as riparian corridor impact. Any SWH that is located along a stream and is within 100 feet of the edge of pavement will be included with the SWH acreage calculated in Step 2.a.(see Figure 2).
        ii. A separate calculation should be made for all SWH impacted beyond 100 feet from the edge of pavement, and outside of any riparian corridor SWH impacts calculated in step 2.b.i (See Figure 2).
        iii. For projects where less than 3 acres of SWH are being removed further than 100 feet of the roadway, all potentially impacted Potential Maternity Roost Trees (PMRTs) further than 100 feet from the road must be located with GPS, photographed, and shown on the resource mapping. Fill out the PMRT checklist. Refer to Appendix A for definition of PMRT and Appendix B for the Field Guide for Potential Maternity Roost Tree Determinations.

---

[2] Homer, C.G., Dewitz, J.A., Yang, L., Jin, S., Danielson, P., Xian, G., Coulston, J., Herold, N.D., Wickham, J.D., and Megown, K., 2015, Completion of the 2011 National Land Cover Database for the conterminous United States-Representing a decade of land cover change information. *Photogrammetric Engineering and Remote Sensing*, v. 81, no. 5, p. 345-354

[3] Anderson, D. M. 1982, unpublished. Plant communities of Ohio: a preliminary classification and description. Division of Natural Areas and Preserves, Ohio Department of Natural Resources, Columbus. 183p. Unpublished.

2016 Indiana bat and northern long-eared bat Programmatic Agreement/Programmatic Biological Opinion (PA/PBO) – Technical Guidance[1]

Literature Search:

Prior to doing field work, the consultant shall contact the United States Fish and Wildlife Service-Columbus Field Office (USFWS-COFO) to determine if the project is within a bat buffer. USFWS will not provide a distance to the actual capture or hibernacula, but they will inform the consultant if the project is within a buffer; and if so, which species and type of buffer (capture, swarming, or hibernacula). The request should be sent in an email exactly replicating the template shown below in Figure 1 - i.e., including the ODOT project name and PID in the subject line and the project location coordinates in the email, latitude and longitude in decimal degrees to five places. For non-linear projects such as bridge and culvert replacements, the latitude and longitude of the project centroid can be given. For linear projects, such as add-lanes, resurfacing with culvert replacements, connector roads, etc., give the coordinates for both endpoints of the project. The request must contain the following statement: "This project is a federal aid highway project, and will be coordinated with your office (if coordination is required) through the ODOT-OES Ecological MOA process and PBO. This is a request for bat buffer information only, and a technical guidance letter is not required". The consultant will fill in the information in red. The USFWS will fill in the appropriate check box in the area in blue. Please send all requests to Marci Lininger at marci_lininger@fws.gov. The USFWS will reply to your email, checking the appropriate option. This information will be used to fill in the correct sections of the Indiana Bat and Northern Long-eared Bat Field Assessment Checklist (Field Checklist, see Appendix B) and the Federal Species table in the ESR. For all projects written by ODOT District environmental staff or OES staff, the data layer will be included in the Eco_Template for Arc GIS located on the O drive. The report author must check the data layer and include the information listed above in the Field Checklist and summarize the information in the ESR.

Figure 1: Bat detection buffer USFWS email template.

TO: marci_lininger@fws.gov

FROM: *Consultant/Firm email*

DATE: *Date*

SUBJECT: **Bat buffer request for ODOT project** *XXX-XX-XX-XX* (PID *XXXXXX*)

This project is a federal aid highway project, and will be coordinated with your office (if coordination is required) through the ODOT-OES Ecological MOA process and PBO. This is a request for bat buffer information only, and a technical guidance letter is not required.

Project coordinates

Lat: *xx.xxxxx*

Long: *-xx.xxxxx*

The project is located within the following bat buffer:

____ BLUE (IBAT hibernaculum)

____ PURPLE (NLEB hibernaculum)

____ RED (IBAT swarming location)

____ YELLOW (Acoustic IBAT detection)

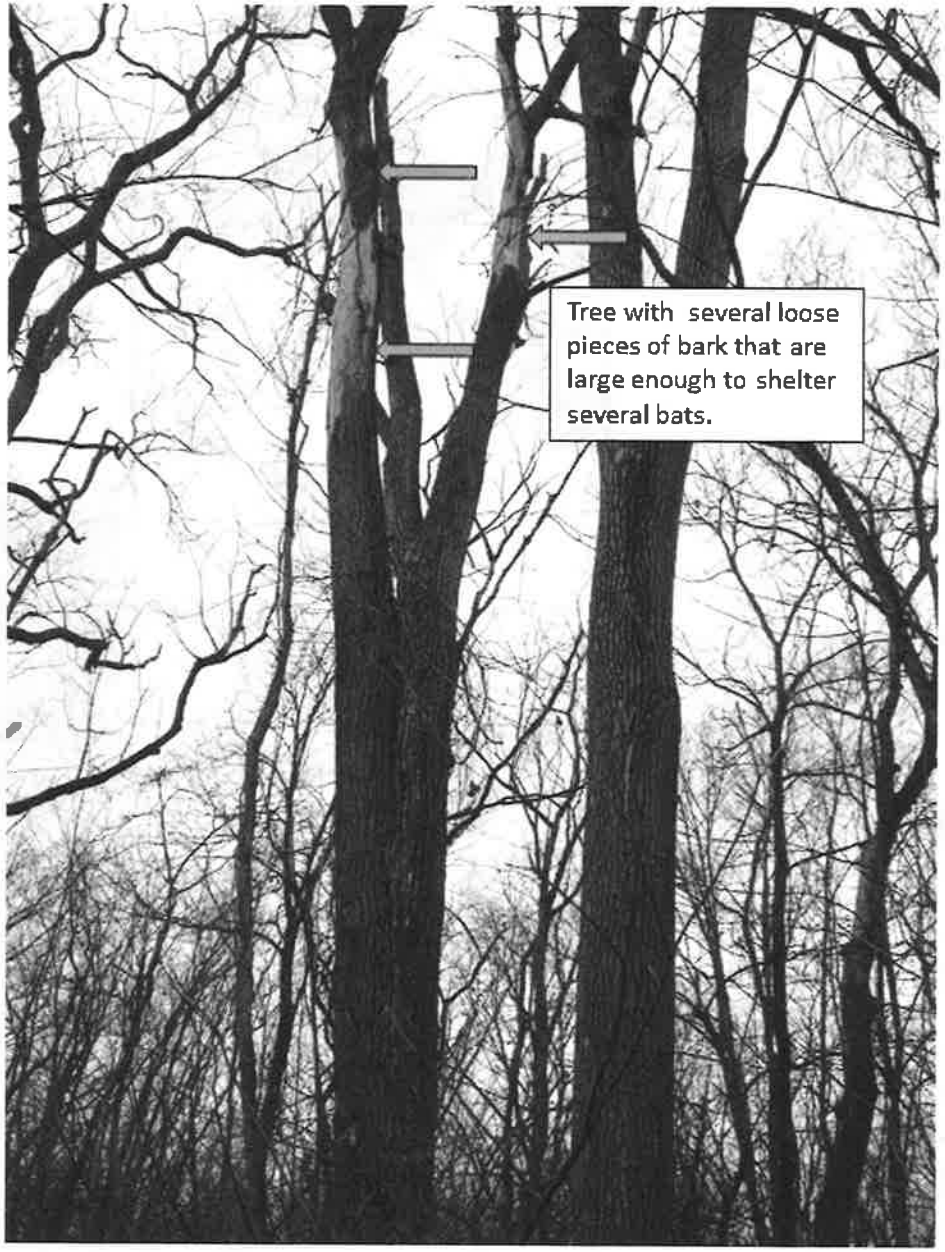
____ GOLD (IBAT maternity colony)

____ BROWN (NLEB maternity roost)

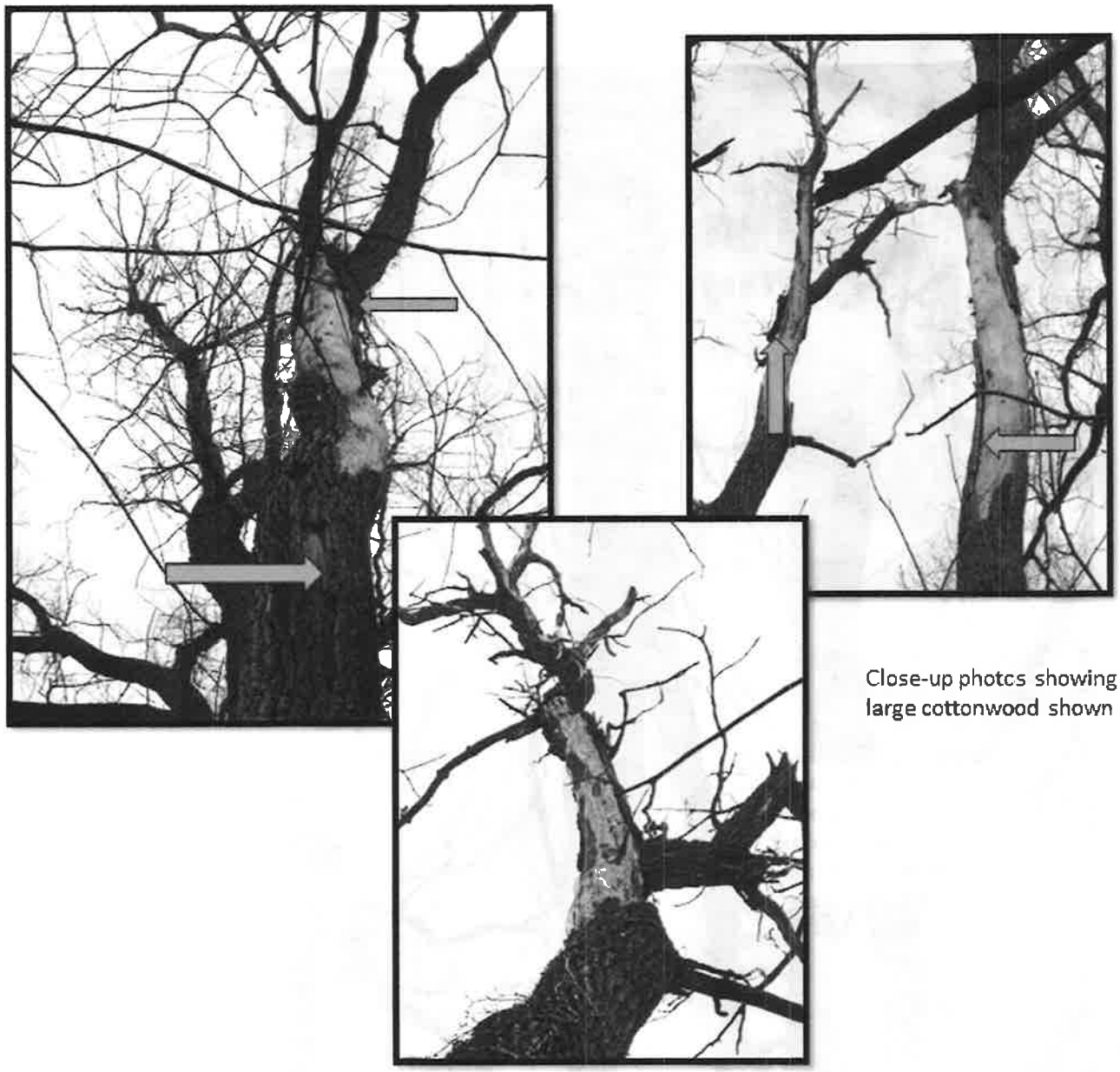
____ GREEN (Male/Non-repro female IBAT)

____ Project is not located within a bat buffer

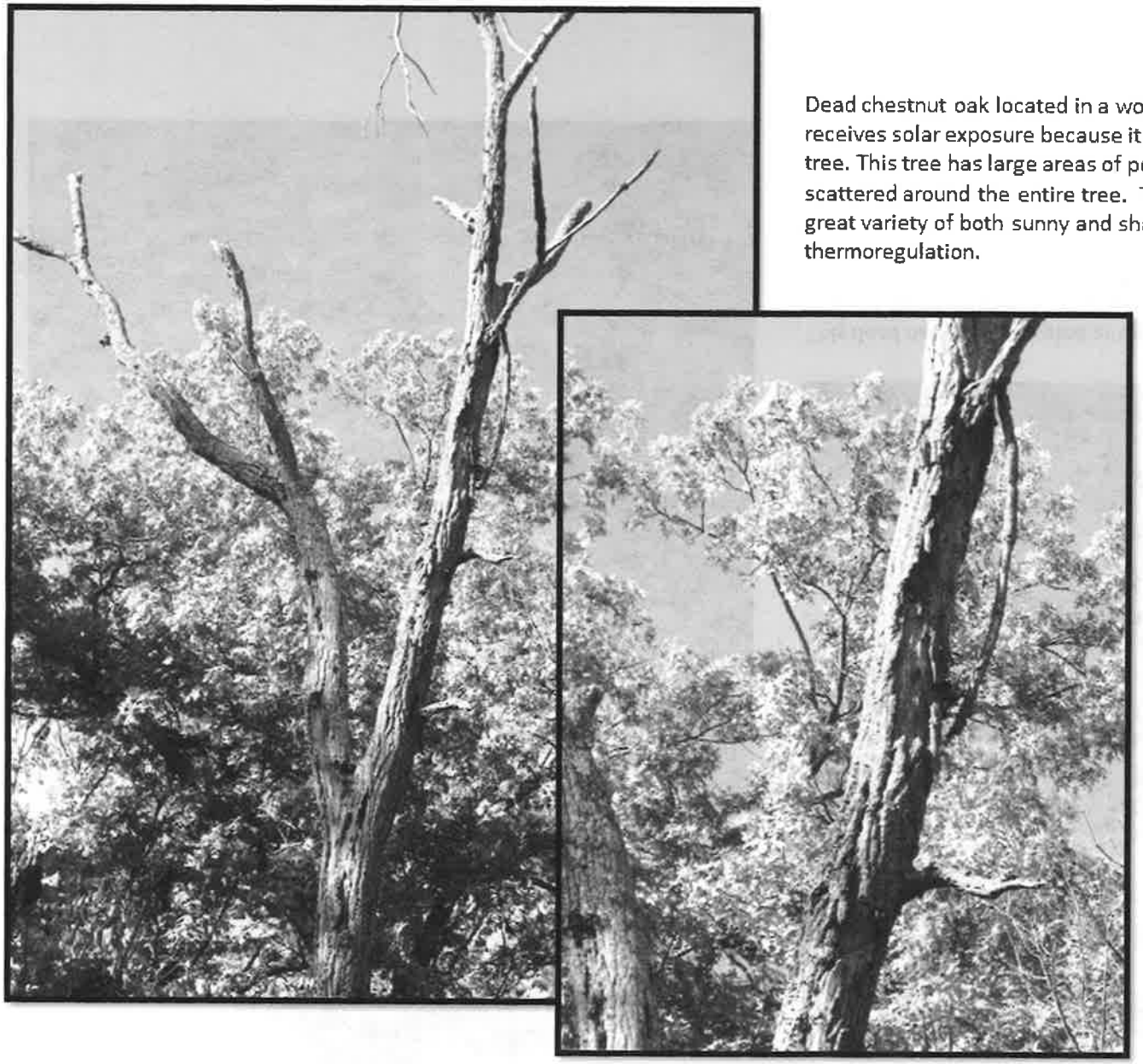
[1] The environmental review, consultation, and other actions required by applicable Federal environmental laws for this guidance are being, or have been, carried-out by ODOT pursuant to 23 U.S.C. 327 and a Memorandum of Understanding dated [December 11, 2015], and executed by FHWA and ODOT.



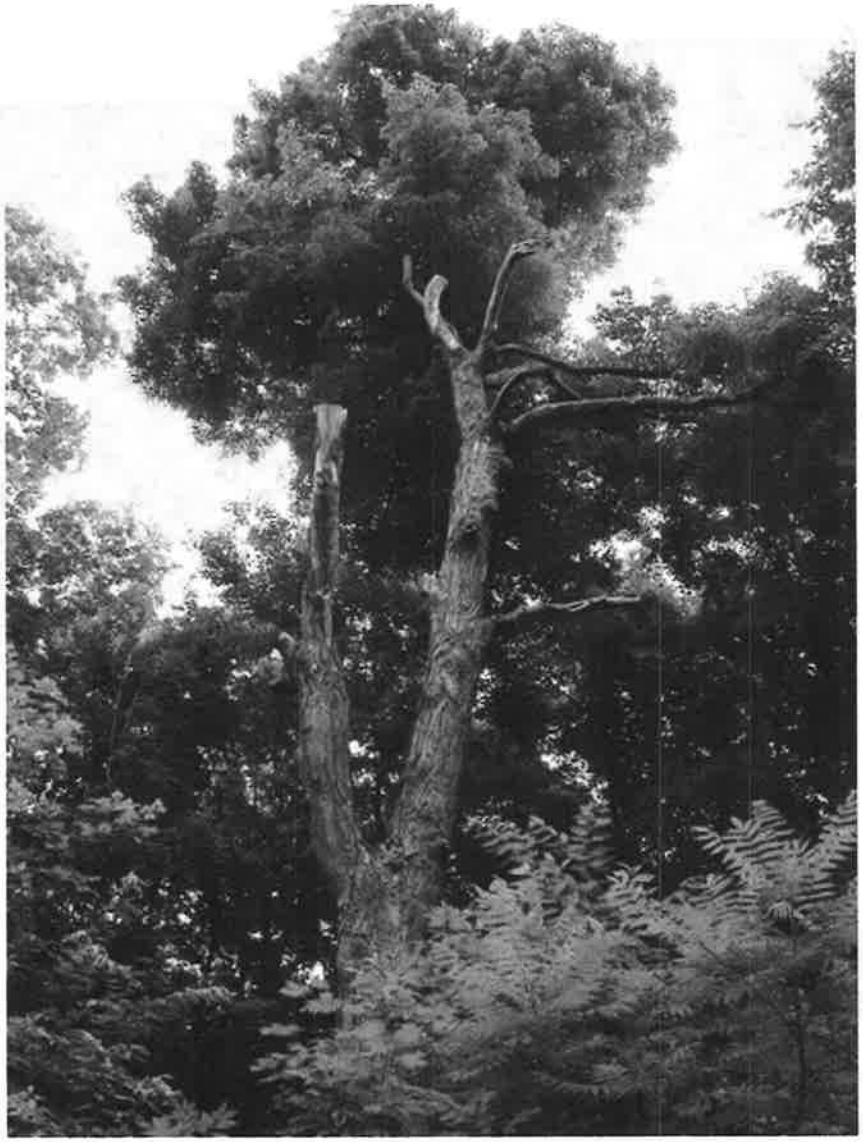
This large eastern cottonwood is located at the edge of a woodlot where it receives solar exposure for half the day. It has several areas of peeling bark that can shelter a maternity colony and allow the colony to move for better thermoregulation.



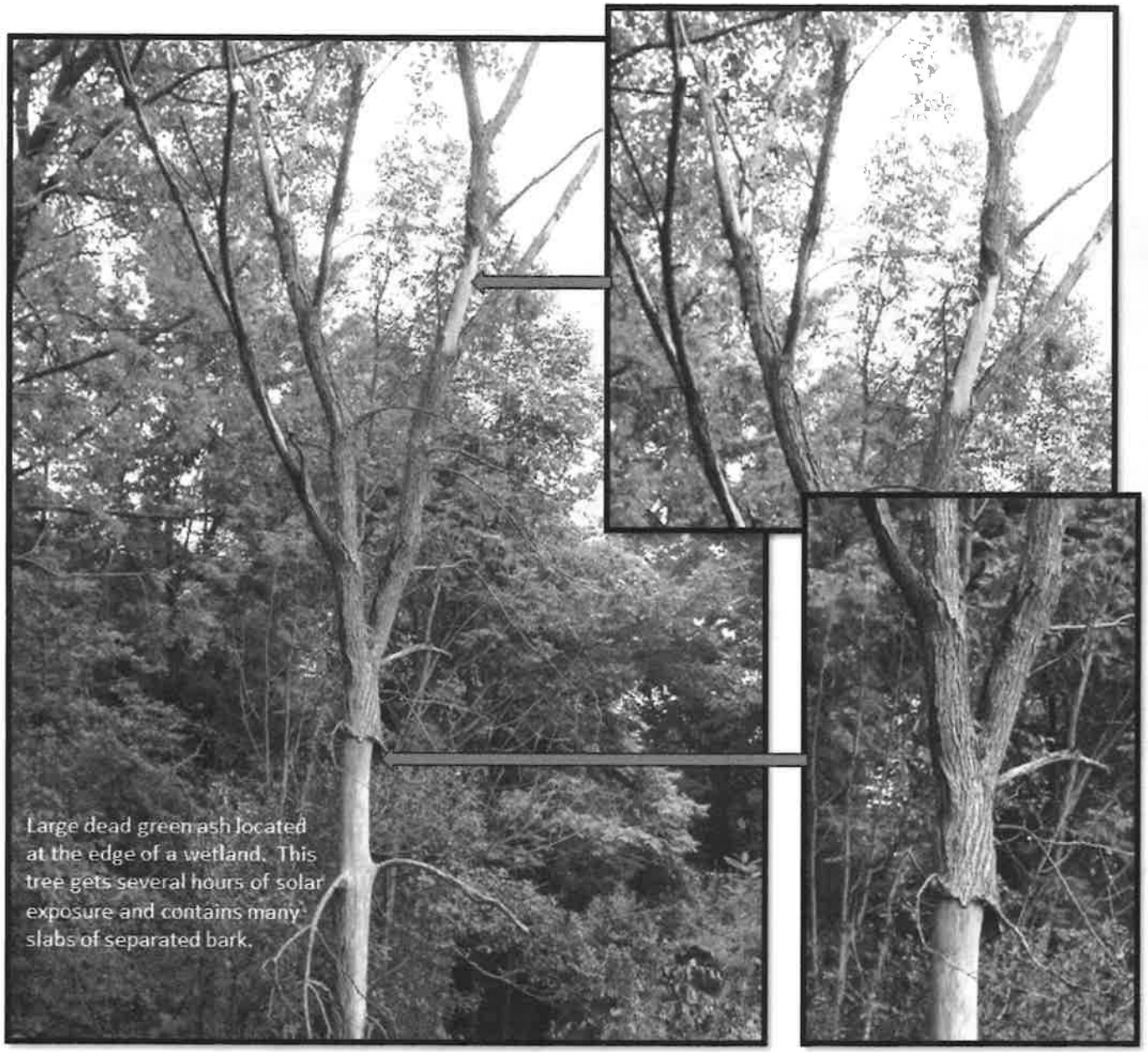
Close-up photos showing areas of habitat on the large cottonwood shown on the previous page.



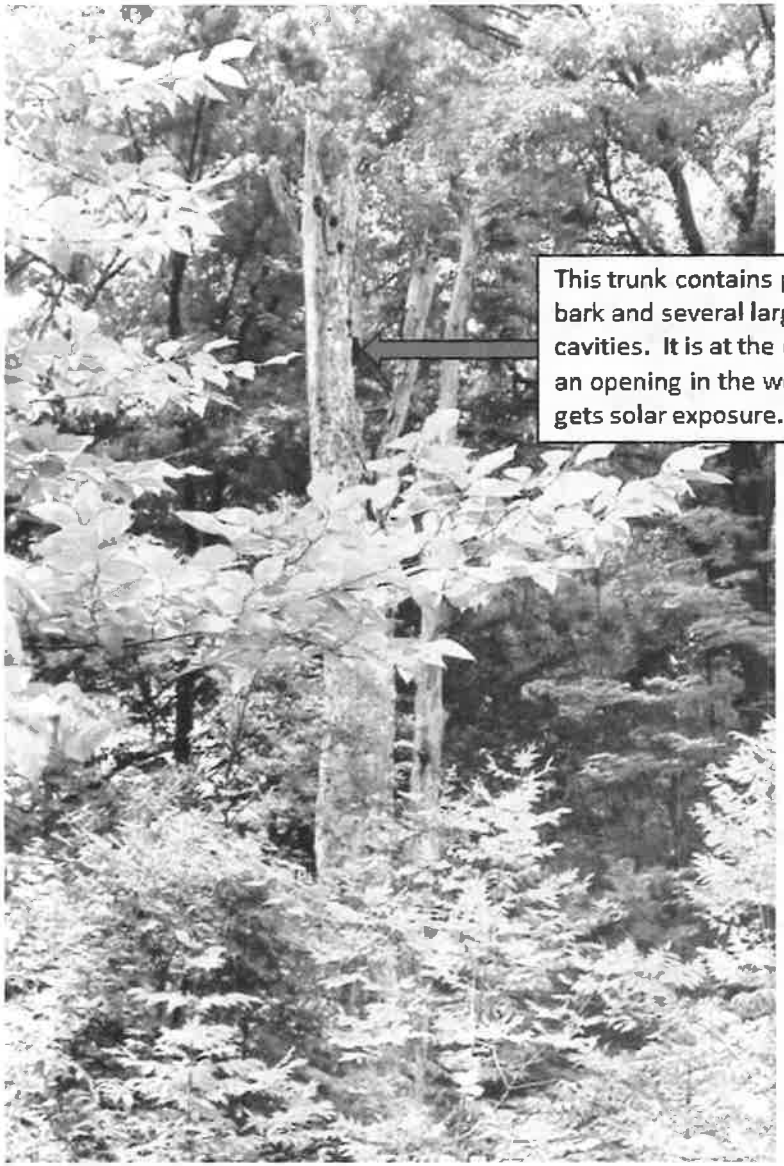
Dead chestnut oak located in a woodlot. This tree receives solar exposure because it is a super-canopy tree. This tree has large areas of peeling bark scattered around the entire tree. This tree offers a great variety of both sunny and shady areas to aid in thermoregulation.



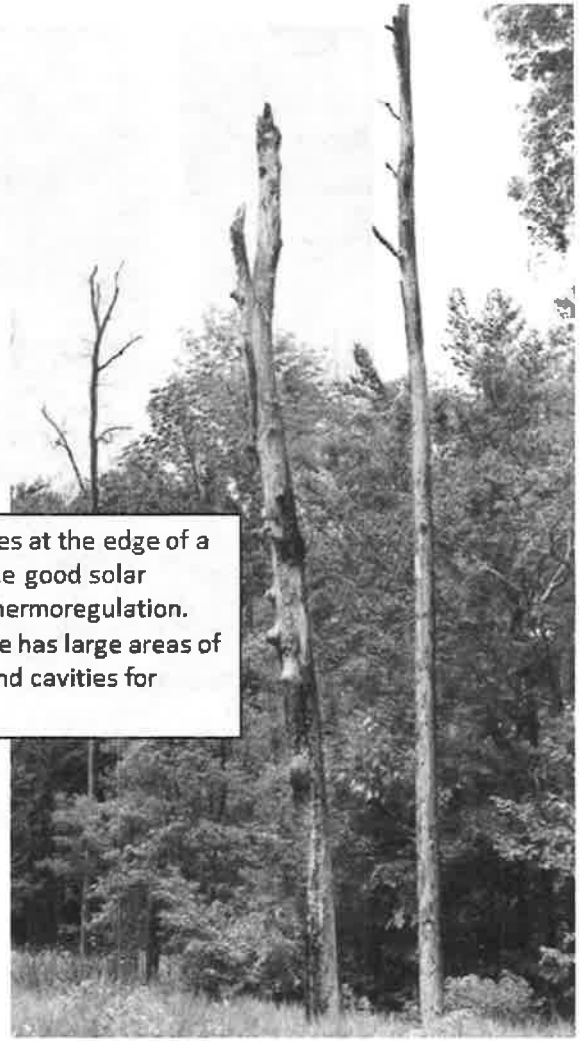
This dead oak tree is located at the edge of a woodlot. It offers solar exposure for at least half of the day, and possesses peeling bark, split limbs, and several cavities.



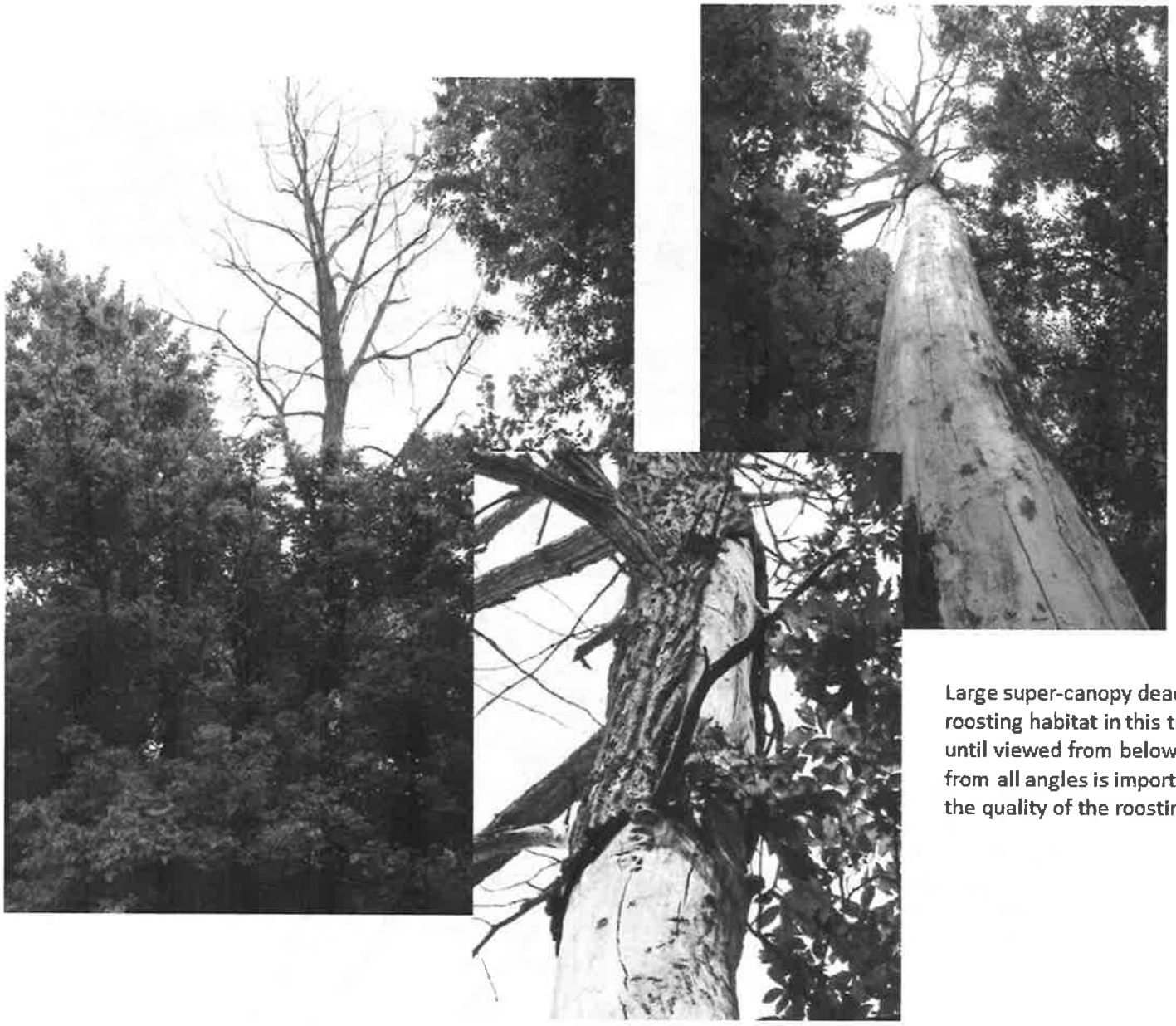
Large dead green ash located at the edge of a wetland. This tree gets several hours of solar exposure and contains many slabs of separated bark.



This trunk contains peeling bark and several large cavities. It is at the edge of an opening in the woods, so gets solar exposure.

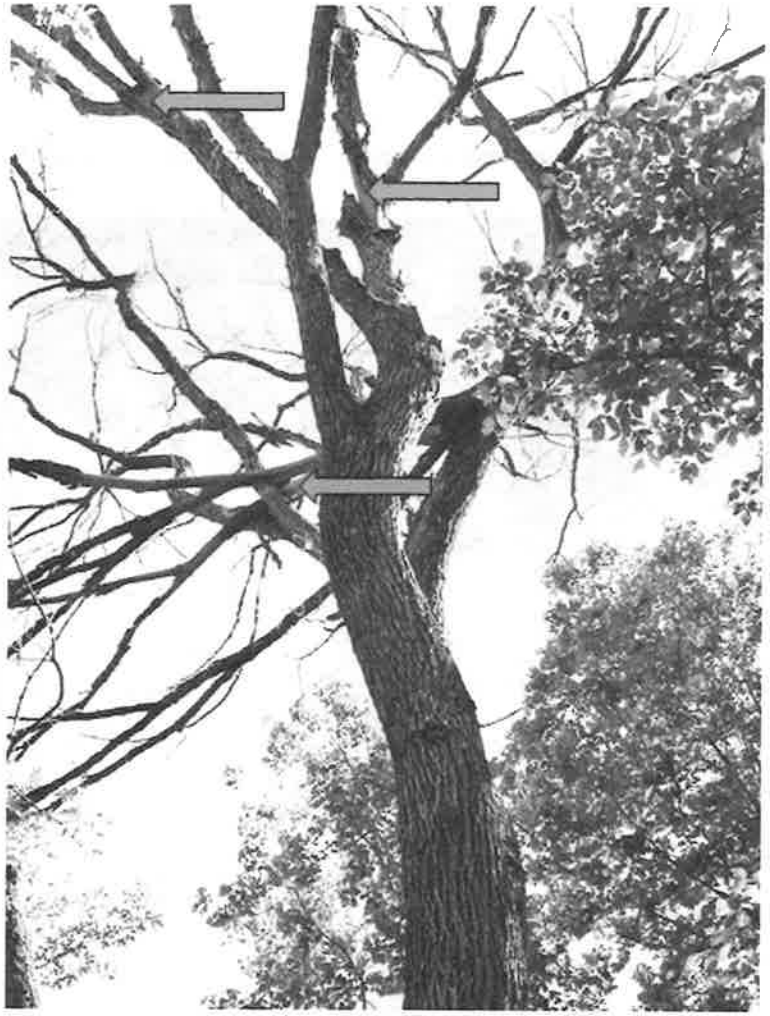


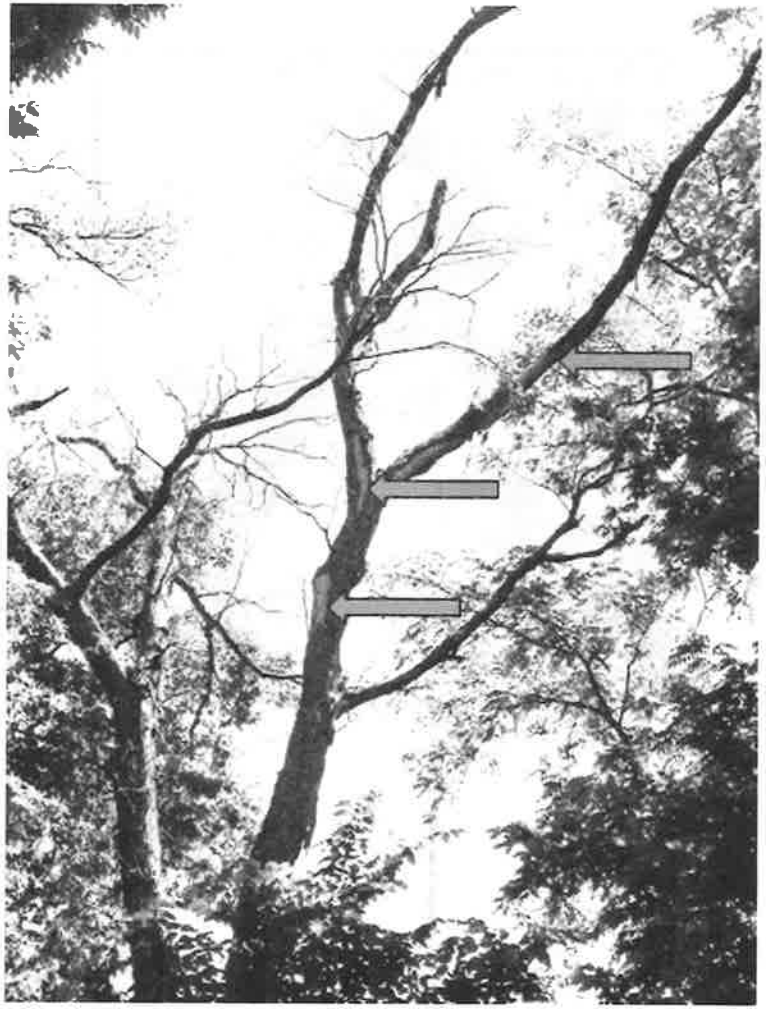
Large dead trees at the edge of a wetland provide good solar exposure for thermoregulation. The largest tree has large areas of peeling bark and cavities for roosting.



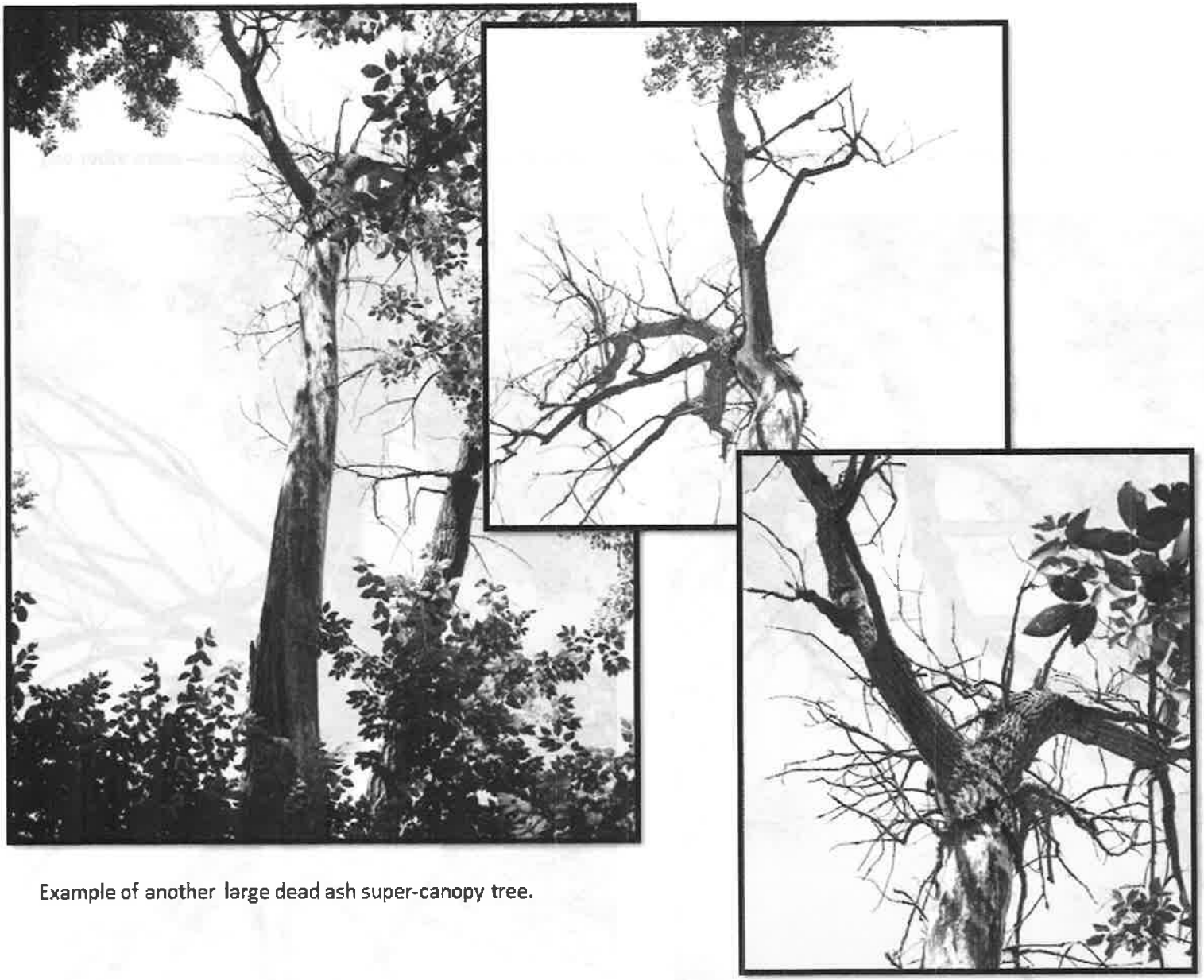
Large super-canopy dead ash tree. The roosting habitat in this tree is not apparent until viewed from below. Looking at trees from all angles is important in determining the quality of the roosting habitat.

When roosting habitat is located only on the branches, the branches must be at least 8 inches in diameter at the location of the habitat. The blue arrows in the photo show areas that may offer maternity roosting habitat. The red arrows show areas of peeling bark that would most likely not be used because of the small diameter of the branch.





Two large super–canopy trees with numerous areas of peeling bark that could support a maternity colony located on larger limbs.



Example of another large dead ash super-canopy tree.

Appendix C

Preliminary Bat Assessment Guidelines for Bridges/Structures *and* Bridge Bat Inspection Form.

(based on guidance in the FHWA/FRA Range-Wide Biological Assessment for Transportation Projects for Indiana Bat and Northern Long-Eared Bat found at:
http://www.fws.gov/midwest/endangered/section7/fhwa/index.html)

FHWA/State DOT/FRA

Preliminary Bat Inspection Guidelines for Bridges

DOT Environmental Division

Adapted from the Indiana Department of Transportation 2010 Bridge Inspection Manual and the Bernardin, Lochmueller and Associates 2007 document.

The guidelines in this document describe favorable characteristics of bridges that may provide habitat for many bat species and preliminary indicators intended to determine if any bat species are using bridges.

Individuals conducting reviews for bats must use the Bridge Bat Inspection Form and must include a copy of the completed form in their project file. Individuals assessing bridges should employ appropriate safety measures in conducting these reviews and avoid touching any bats. Recommended equipment include a flashlight (preferably a headlamp), hard hat, binoculars or spotting scope, digital camera, check list and a fine- to medium-point permanent marker or pen. It is advisable that individuals also consider having a dust mask, cellular phone, and boots if access beneath structures is desired. Easily removed, protective coveralls may be advisable if access requires crawling.

Bridge bat inspections conducted pursuant to the FHWA/FRA range-wide programmatic informal consultation are valid for one year from the date of the inspection. If a mist net or acoustic surveys are used in place of the Bridge Bat Inspection protocols, those surveys are typically valid for two years; but agencies should verify with the appropriate U.S. Fish and Wildlife Service (Service) Field Office. There is no requirement for a follow-up evaluation seven days prior to beginning construction provided the assessment or survey follows the required protocols.

Favorable Characteristics

Cracks in Concrete

Cracks in the concrete are used by bats as a foothold in roosting (Photo 1). In addition, some bats may be hidden from sight in wider cracks in the concrete and behind deteriorating concrete sections in the ceiling or walls. Look for cracking along support beams and inner walls especially below a fillet (a concrete filling between ceiling and vertical beam). During inspection, sounds may be heard coming from behind such cracks and/or expansion joints.

Large dying silver maple that offers several areas of peeling bark with varying levels of solar exposure.

Expansion Joints (Bridges)
Expansion joints can provide protected cover for bats (Photos 2 and 3), but do not always provide habitat, depending upon whether they are obstructed by road debris or other blockages to use. If possible during the inspection, individuals should look into expansion joints or in other cracks with a flashlight. If joints are used by bats, often there will be guano under the joints (Photos 4-6), but not always, since the joint may be located over water.

Cave-like Environment
While inspecting bridges, look for dark environments that mimic cave-like conditions such as under the deck of the bridge (Photos 12 and 13). This may involve crawling under low areas so a hard hat is recommended. Such places (e.g., a concrete bunker secreted into a hillside with an open front) provide protection from wind, rain, sleet, hail and predators. Bats do not roost near the ground where predators (cats, raccoons, etc.) can reach them. Roosting is usually at least 4 feet from the ground.

Large Rivers in Wide Floodplains (Bridges)
Many concrete bridges that span larger rivers in wide floodplains offer excellent areas for roosting, although bats are not restricted to using these sites. These areas tend to have an ample food supply and may also serve as historic flyways for bats during migration (i.e., March-May and September-November). These bridges may also offer opportunities for mating in late fall.

Preliminary Indicators of Bat Presence
The four indicators presented here document physical observations that can easily be made for individual structures. Each of these indicators should be considered on its own merits and the presence of even one of these on a bridge is enough documentation to confirm bat usage. If questions arise regarding interpretation of these indicators, individuals should contact the District Environmental Coordinator for clarification or assistance. (NOTE: Some of these indicators, visual and sound, will not be present during normal hibernation periods, as bats do not hibernate under bridges. Hibernation usually occurs between September and May, but contact your local USFWS Field Office for exact dates.)

Visual
Look for bats flying or roosting (hanging) during the assessment (Photo 1, 2, & 8). A flashlight or headlamp will be needed and binoculars may be necessary when viewing higher areas. If bats are present, record numbers as best as possible and their locations. Note any dead or injured bats. A sketch map would be helpful (can use bridge plan sheet as base for sketch). Thermal infrared cameras or emergence surveys can be used to document bat use.

Use of presence/absence summer surveys may also be used if the following apply:

- A presence/absence summer survey is already necessary because there will be tree removal associated with the project. The results of the presence/absence summer survey for a near-by project is <u>not</u> sufficient. The survey should be specific for the project in question.
- Survey points over water/edge of water (if there is a small stream) should be incorporated into the study plan.
- Survey points should be identified first based on the habitat on site then, if a point is not within 0.25 miles of a bridge, an additional level-of-effort is necessary. Either a survey point should be added within 0.25 miles, or the previous mentioned

techniques (bridge inspection, emergence survey, thermal infrared cameras) should be used.
- The Service Field Office is required to review the survey SOW.
- If the bridge is within a known maternity colony home range a bridge assessment is required.

Sound
Listen for high pitched squeaking or chirping during the inspection and identify location(s) for later examination by DOT staff. This may be helpful in locating bats within deep cracks or open joints. A sketch map would be helpful.

Droppings (Guano)
Bat droppings are small (mouse-like in appearance but less regular) brown or black pellets (Photos 6 - 8). Older droppings may be gray in color. These droppings will accumulate on the ground, floor of a covered bridge or on structural components below where bats roost. Droppings may also adhere to support beams and walls below roosts.

Note bat droppings and their location. Check under likely roosting spots such as cracks, cave-like areas, and expansion joints. If guano is present, the inspector may wish to wear a dust mask. Also, it is advisable to wear rubber boots to minimize tracking of any guano into vehicle(s) and other places.

Staining
Stains may appear wet and are usually found in dark places. Look for four to six inch wide dark stains located on concrete support beams and walls immediately below the ceiling of the bridge, and beneath joints (Photos 8 - 11).

Literature Cited

Bernardin, Lochmueller, and Associates, Inc. 2007. Bridge Inspection Checklist for Bats. Unpublished. Evansville, Indiana.

Indiana Department of Transportation. 2012. INDOT Bridge Inspection Manual. Indiana. Available from: *http://www.in.gov/dot/div/contracts/standards/bridge/inspector_manual/index.htm*.

Keeley, Brian W. and Merlin D. Tuttle. 1999. Bats in American Bridges. Bat Conservation International, Inc, , Austin, TX. Resource Publication No. 4, 41 pp.

Photos *

Photo 1: Bats hanging from cracks along Support beams

Photo 2: Visible bats within an expansion joint

Photo 3: Example of open concrete joint used by bats

Photo 4: Guano deposits visible from bridge deck, on top of pier

Photo 5: Guano deposit on pier, obscuring structural features.

Photo 6: Bat Guano on Riprap

Photo 7: Staining along longitudinal joint. Note guano deposits on the ground.

Photo 8: Staining on underside of expansion joint from bat use.

Photo 9: Staining on sides of pier caps

Photo 10: Guano staining on side of pier

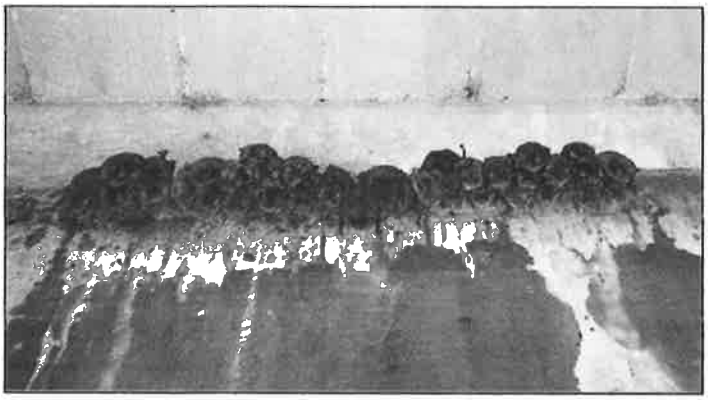


Photo 11: Bats Roosting & Associated Staining

Photo 12 and 13: Bridge Design Mimicking "Cave-like" Atmosphere

Photo 14: NLEBs Roosting Under a Timber Decked Bridge

* Photos courtesy of Tom Cervone, Bernardin, Lochmueller and Associates, Jeff Gore, Florida Fish and Wildlife Conservation Commission, Rick Reynolds, Virginia Department of Game and Inland Fisheries, and Kraig McPeek, U.S. Fish & Wildlife Service.

Bridge Bat Inspection Form

This form will be completed by and/or submitted to the District Environmental Coordinator by a qualified inspector prior to conducting any work below the deck surface either from the underside, from activities above that bore down to the underside, or that could impact expansion joints, from deck removal on bridges, or from structure demolish. Each bridge/structure to be worked on must have a current bridge inspection. Any bridge/structure suspected of providing habitat for any species of bat will be removed from work schedules until such time that the DOT has obtained clearance from the US Fish and Wildlife Service, if required. Additional studies may be undertaken by the DOT to determine what species may be utilizing structures prior to allowing any work to proceed.

DOT Project #	Water Body	Date/Time of Inspection

Route:	County:	Federal Structure ID:	Bat Indicators Check all that apply. Presence of one or more indicators is sufficient evidence that bats may be using the structure.				
			Visual	Sound	Droppings	Staining	**Notes: (e.g., number & species of bats, if known. Include the results of thermal, emergent, or presence/absence summer survey)**

Areas Inspected (Check all that apply)

Bridges		Culverts/Other Structures		Summary Info (circle all that apply)			
All vertical crevices sealed at the top and 0.5-1.25" wide & ≥4" deep		Crevices, rough surfaces or imperfections in concrete		Human disturbance or traffic under bridge/in culvert or at the structure	High	Low	None
All crevices >12" deep & not sealed		Spaces between walls, ceiling joists		Possible corridors for netting	None/poor	Marginal	Excellent
All guardrails				Evidence of bats using bird nests, if present?	Yes	No	
All expansion joints							
Spaces between concrete end walls and the bridge deck							
Vertical surfaces on concrete I-beams							

Assessment Conducted By: _____ **Signature(s):** _____

District Environmental Use Only: Date Received by District Environmental Coordinator: _____

DOT Bat Assessment Form Instructions

1. Assessments must be completed a minimum of 1 year prior to conducting any work below the deck surface on all bridges that meet the physical characteristics described in the FHWA, FRA, FTA Range-wide Programmatic Informal Consultation, regardless of whether assessments have been conducted in the past. **Due to the transitory nature of bat use, a negative result in one year does not guarantee that bats will not use that structure in subsequent years.**
2. Legible copies of this document must be provided to the District Environmental Coordinator within two (2) business days of completing the assessment. Failure to submit this information will result in that structure being removed from the planned work schedule.
3. Any bridge/structure suspected of providing habitat for any species of bat will be removed from work schedules until such time that the DOT has obtained clearance from the USFWS, if required. Additional studies may be undertaken by the DOT to determine what species may be utilizing each structure identified as supporting bats prior to allowing any work to proceed.
4. Estimates of numbers of bats observed should be placed in the Notes column.
5. Any questions should be directed to the District Environmental Coordinator.